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This document is Part II of a two-part project whose object was to identify children's sequential development from birth through age seven and to identify the materials which would be used to strengthen or initiate a behavioral facet. The materials surveyed for potential use with preschool children are described as ranging from standard toys through materials utilized in secondary school systems for educational purposes. The materials are evaluated for application in the developmental sequence. The report is divided into three sections: (1) Material Survey and Application, (2) Manufacturers' Materials Survey, and (3) Materials and Techniques Used in Child Development Centers, Appendixes include (A) Summary of Manufacturers' Reports, (B) List of Manufacturers Supplying Product Data, and (C) Directions for Abstract Card Sorting. (DO)

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CHILD DEVELOPMENT AND MATERIAL SURVEY

PART II - MATERIAL SURVEY

ENKI CORPORATION

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FINAL REPORT
Contract Number OEO-4190

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STAS INSTRUCTIONAL MATERIALS, INC.

Product:	Discovery kits.
Use or Function:	To present self-contained laboratory units (science) for experimentation.
Skills Required:	Motor, locomotion, intellectual, educational skills.
Rigid or Flexible:	Rigid, but with many experiments.
Ages Designed For, How Determined:	Primary through 12th grade. Various levels of difficulty.
Transportation of Product:	Yes.
Limited Use, or Not:	No. Many experiments.
Used Independently or with Assistance:	Used by children; not for teacher demonstration.
Adequate Size for Age Group? How Determined:	Yes. By whether it was large enough for manipulation, small enough for low cost.
Selection Criteria for Materials:	Safety, durability, ease of handling.
Safety Considerations:	Durability and ease of handling.
Reasons for Color Selection:	Not important.
Retail Price Range:	$4.50-$25.00.

R.H. STONE PRODUCTS

Product:	Mor-Pla Jumbo Blox, train, trucks, playmobiles.
Use or Function:	Active, co-operative play.
Skills Required:	Motor, manipulation.
Rigid or Flexible:	Flexible.
Ages Designed For, How Determined:	Pre-school, primary, special education.
Transportation of Product:	Yes.
Limited Use, or Not:	All designed for more than one.
Used Independently or with Assistance:	Both.
Adequate Size for Age Group? How Determined:	Yes. Testing in school groups.
Selection Criteria for Materials:	Suitability, cleanability, durability.
Safety Considerations:	Strength, round edges, non-poisonous, non-inflammable.
Reasons for Color Selection:	Natural uncolored finish for economy and safety.
Retail Price Range:	School field only.

This report is submitted in partial fulfillment of the requirements of Contract Number OEO-4190. These findings are based on ENKI Corporation research, and do not necessarily reflect the opinions of the Office of Economic Opportunity.

PART II

MATERIAL SURVEY

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SECTION I - MATERIAL SURVEY AND APPLICATION

REVIEW OF MANUFACTURERS

The survey of materials for potential use with preschool children ranged from standard toys through the materials utilized in secondary school systems for educational purposes. The range of the survey was intentional in not delineating utilization or limiting it to materials designed for preschool children. This technique was fortunate, as indicated in the Manufacturer's Survey (Figure II-1 through II-16), because the manufacturers generally limit their application considerations of particular materials. Traditionally, they market materials for the specific population for which they have been designed. They also employ few professional and/or technical assistants in application considerations. Usually, the development of materials results from requests for particular items, or the manufacturers' decisions to develop prototypes. These are then field tested for a single class of customer and, if acceptable, are marketed. Because of this approach to material development utilization is historically limited to school categorizations such as "materials for preschool", "elementary school", "secondary schools", "college", etc. Very little consideration is given to the versatility of these materials with different teaching techniques at simpler levels of understanding.

MATERIAL APPLICATION

The ENKI Corporation staff approached the question of material evaluation and classification quite differently. Each material assignment was carefully evaluated for its potential application in the developmental sequence. In many instances it was found that the developmental process of the child could be assisted or a particular phase could be strengthened by a utilization of materials originally designed for chronologically more advanced children. For example, biological charts of plant life and growth designed for high school biology classes would be extremely well suited in conjunction with the actual growing of plants in the classroom to acquaint the child with the growth process.

In applying this nonrestrictive evaluation approach it was also found that many materials designed for particular functions have equally valuable potential in other facets of the developmental process. If these materials happened to be designed for preschool children, then obviously the child would benefit from both functions when utilizing the materials but, unfortunately, the teachers would not be aware of the implications of the particular material and might not strengthen or develop the different facets of the developmental process, and limit usage to the material's labeled design function.

Study Organization

The materials reviewed in this study have been classified in terms of categories without identifying minor differences between similar products developed by several manufacturers. Unique factors are identified when they have some application to the developmental process. This section is organized in three major categories. The first reviews the materials and their general application to major developmental categories. The second reviews the materials in terms of developmental categories, so that for a particular function the applicable materials can be identified. The third reviews the approach utilized by manufacturers in the consideration and development of new materials. We offer some insight into the individuals who order materials, and indicate the sort of expertise employed in the material recommendations. It should be noted that reference to the lack of systematic employment of professional expertise in material development should not be interpreted as an indictment of the manufacturers. They are limited by financial considerations, and their decisions are commercially oriented. It is only our purpose to identify the techniques applied in material development so that these may be considered in evaluating manufacturer recommendations prior to purchase for specific developmental sequences.

MATERIALS ASSOCIATED WITH PRIMARY FUNCTIONS

Visual Development

Because the earliest visual development is tracking behavior, the simplest appropriate materials for the neonate's visual development are mobile crib toys. To provide maximum function of this earliest ability, it is advisable to utilize mobile crib toys rather than stationary toys.

The next phase of visual development is the perception of objects in their own right. This ability is usually developed in association with exploratory behavior, using the hands and the feet. During this phase the neonate develops the concept of visual space being real. The most effective materials for the development of this concept are stationary yet readily graspable objects placed within the crib. Colorful objects on the walls on the perimeter of the infant's room are also helpful in providing objects for visual fixation beyond the child's react. As the child progresses through the visual search phase these objects assist him in focusing, and in developing an awareness of the various depths of the visual world. This category of materials includes bright pictures; three-dimensional designs, etc. These, if carefully selected for their content value, are also useful as the child progresses in age. They can acquaint him with objects such as characters from nursery rhymes, animals, etc.

An understanding of three-dimensional space is the next important phase in visual development. Materials that contribute to this understanding are geometric objects and blocks which the child can use for organization and verification of his conceptions of space. Building and operating in three-dimensional space, he is able to correlate his tactual experience with the visual and, thus, augment his understanding of the meaning of vision. He also learns of the three-dimensional cue of distance, etc. The utilization of geometric objects and form is of extreme importance in the visual development of the child, as this is the initial basis for the written communication abilities. (See Part I; Section I, Writing and Drawing).

The next group of materials important to visual development are the colored objects (colored forms, papers, crayons, etc.). Not only are they important to the development of the ability to differentiate colors, but they form a foundation for later reading and writing development. Children who are taught early to organize the visual perceptual world in terms of its three-dimensional space, and who learn to utilize geometric forms are superior readers in first and second grade.

Required Materials

The development of depth and space perception would be greatly enhanced by the introduction of materials designed for that purpose. Present materials are not so designed. It is now only through secondary uses of building materials that the child develops a concept of depths and three-dimensional space. New materials would be very useful in aiding the child to verify his visual perception of three-dimensional space through a manipulative technique.

AUDITION

The materials for auditory development may be divided into several major categories. First are noise-producing materials which will motivate the neonate to orient himself

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toward the noise-producing object. In this manner, he begins to track the auditory stimuli, and begins the development of early cues of auditory discrimination.

The second phase of auditory materials includes various music producing and different sound producing materials. These are primarily in the toy category, but records, etc., can be utilized. These sound and music producing materials are of considerable value in teaching the child to devleop the ability to differentiate tones and rhythms, etc.

During the next phase of auditory development the infant and child achieve an understanding of tonal difference, rather than merely reacting to different tones. Manipulative musical materials that do not require musical skills are useful because they permit the child to verify different tone sounds through already acquired manipulative skills. At this point the child has also developed the ability to discriminate and locate sound in three-dimensional space. Unlike the visual materials which permit some verification of three-dimensional space, auditory space perception (sound localization) is learned informally when the infant turns toward the direction in which he perceives the sound originating, and verifies the sound by observing a sound-producing object or person. The ENKI Corporation survey of manufacturers' materials did not reveal any available items designed specifically to enhance the ability of three-dimensional sound perception.

The development of rhythm and meaningful tone differences as exemplified in songs is the next stage in auditory development. In this category the materials range from cymbals, drums, and other musical instruments, to records. In using records during this phase of development it is important that records featuring simple tonal combinations, rather than symphonic melodies with complex orchestration, be utilized. The child in the stage of development cannot appreciate the differences between the various instrumental qualities.

HAND MANIPULATION

The materials discussed in this section are primarily oriented towards the development of hand motor manipulation functions, but one must consider that the visual aspects associated with hand coordination are very important. This is true except for severely visually handicapped children, and they are not considered in this study.

The first phase is associated with materials designed to aid the infant in developing head strength and the grasping reflex. Primary among these are stationary crib materials such as cradle gyms. Other materials that are within the reach of the infant also aid in the development of these abilities. The materials for motor development should be stationary so the infant's hand can hit them and the grasp reflex come into play. It is important that the materials for this grasp reflex strengthening be within the radius of the infant's arm, and of a size which will permit him to hold onto the material with the grasp reflex. Extreme caution must be taken so that these materials are solidly attached and distance sufficient to prevent the infant from putting small objects in his mouth.

In this phase the materials (rings, rods, etc.) should be sufficiently small to be grasped by the infant's hand on contact through the reflex action. Large materials such as spheres, etc., should not be within the physical reach of the infant because they will not strengthen the grasp reflex, and they may possibly extinguish because of the inability of the infant to grasp the object. It is important that this behavior be rewarded with success rather than frustrated by failure during this phase.

Following the initial strengthening of the grasp reflex, the infant learns to reach for a particular object and move it within his range of motion. During this second phase, feedback from his gross motor movements is also important. Small but easily grasped mobile objects such as rattles and small blocks are of primary importance. These objects should be small enough to grasp readily within the hand contact, but have sufficiently large dimensions to prevent the infant from putting them in his mouth and swallowing them. Small, soft toys, such as stuffed animals, dolls, etc., that can be picked up by the infant are valuable in the grasping reflex and motion. Auditory feedback (e.g., rattle) or extremely bright colors are desirable in these materials to provide additional stimulation through auditory or visual senses.

The next stage of motor manipulation development is the ability for directed manipulation. This is the ability to manipulate objects within the reach environment of the child in a coordinated manner. Materials most applicable in this phase are those requiring either stacking or organizing behavior, but not requiring geometric and visual space perceptual organization ability. Rings placed on a rod are effective if the size organization is not manditory. Other suitable materials include stacking toys that are small enough for the infant to grasp in his hand, interlocking cups, triangles, etc.

The next phase of hand minipulation development is oriented toward the finer motor skill development. Materials that require finer motor skill manipulation are of extreme value in developing this behavior. Among these materials are large beads for stringing; interlocking blocks and other geometric forms; lacing boards, etc. Also recommended to be included at this stage are a number of toys which normally are not considered in strengthening this developmental phase. They are, for instance, telephones that require finger insertion in a small hole, and small manipulative objects including animal farms, circuses, or like items that require some care in standing them up. Also valuable at this stage are dolls (with clothing) requiring considerable manual skill for dressing and undressing. Many other manipulative toys and materials fall into this category. Tinker toys, operational toys such as banks, musical toys with knobs or other protrusions requiring activation, and many craft materials such as weaving, leather craft, and design boards are among these materials.

The fifth phase of manual manipulation skills deals with directed skill development preliminary to writing. This phase is obviously coordinated with visual perceptional development. Aids in this phase are paints, writing and other creative materials, such as clay. When the child is of sufficient age to assure that he will not ingest them, clay and other molding materials can be useful in all phases of manual development. The more sophisticated construction toys such as erector sets and tinker toys, etc., are applicable here also. The tinker toy type material is of value in the development of fine manual dexterity, but it is of greater value in directed behavior where specific coordination and two-hand coordination is required. At this point, painting, writing, using crayons; all of these activities give immediate feedback to the child regarding his ability to coordinate. The utilization of form boards falls within this phase. The reason these motor-coordination form boards were not included in the previous phase is that they are strictly limited by visual perceptual organization. At this point in development, however, the child should be able to organize the perceptual field and modify only his manipulative behavior in inserting the objects correctly in the form board.

Phase six is the most complex phase of motor development. It deals with the developmental strengthening of the specific skill behavior patterns, and requires a correlated development of visual, auditory, and other perceptional skills. Included in this category are the musical instruments, and complex manipulative materials such as puppets, scissors, leather goods, sewing tools, etc.

LOCOMOTION

The first phase of locomotion deals essentially with the ability of the infant to turn over and to move himself around his immediate environment. No particular materials are advantageous in this development, but items of interest, or a stimulating environment within the near visual field of the infant will encourage movement. Any of his hand manipulatory materials are adequate. As he drops them beyond his reach, he will be motivated to move his body to retrieve them.

The second phase of locomotion is concerned with crawling and early walking development. Crawling behavior requires only a stimulating environment which will motivate the infant to move within it. Walking behavior is associated with a number of valuable materials. Early upright behavior will be encouraged if the infant has access to materials that permit him to pull himself up. Low cribs or play pens are ideal for this. Small chairs or stools will encourage his upright posture if the furniture is stable. In addition to the possibility of injury, a falling chair may discourage further upright attempts. Foot movement in locomotion will be encouraged by the utilization of riding toys which require foot movement for locomotion. A material of this kind should be designed so that if the child pulls himself up on it he will be able to use it as a stabilizing aid in walking. During this period, sitting behavior should be directed toward good posture in the sitting position. Chairs and stools of an adequate height for comfortable sitting are requisite to the development and strengthening of a proper sitting posture.

In the third phase, the locomotion development of the child is concerned with a strengthening of the walking behavior, the development of good balance, and development of running and skipping behavior. Any of the materials that encourage walking and running are of assistance during this period. Balance boards (2" to 4" wide boards placed a few inches off the ground) on which the child can learn to balance himself in a narrow walking environment are especially valuable. Secondary materials such as balls encourage and strengthen running behavior.

Phase four is concerned with the more complex locomotion, and includes such behavior patterns as climbing and walking, and taking steps with alternate legs. This behavior is developed and strengthened through the use of climbing materials that are within the child's physical abilities. These may include step stools, stilts, scooters, slides, etc.

The very complex whole-body coordination locomotion procedures including rolling, flipping, etc., are developed during the fifth phase, which usually occurs beyond the chronological age levels considered in this study. The materials necessary to its development, however, are included in this study. In this phase the child requires total body coordination. Some of the materials can be used under close supervision by the preschool child. They are the trampoline, horizontal bars, climbing and swinging ropes and "U" shaped ladders. It is within the ability of the four to six year old child to climb a ladder that is "U" shaped and return back to the ground, even though this requires total coordination and some balance. A note of caution about outdoor play materials for the preschool child should be made. In the selection of materials, one should consider the maximum height to which the child will climb. This should not exceed the height at which a teacher can assist the child in getting off the equipment without having herself to get on. During the development of the complex behaviors the child will often climb to a maximum point and then be afraid to return, panic, and require the teacher to assist in the descent. If the equipment is too high, serious injury to either the child or the teacher may occur.

WRITTEN LANGUAGE

The organization of written language has its developmental etiology in the very young child's awareness and organization of the geometric visual world. The first group of materials valuable in the structuring of this includes geometric forms, blocks, form boards, etc. These encourage and develop in the child an ability to discriminate form, figure-ground relationships, and complex perceptual organization. Puzzles, for example, are good materials for this phase if they are designed in a manner that requires perceptual visual organization rather than merely inlaying into other forms. This does not deny the value of the form board which also utilizes geometric organization; but, the major criticism of most marketed puzzles is that they are either random cuts, selected because of the facility with which they can be cut with a bandsaw, or, they are die stamped so that the total configuration is impressed on the remaining board and the child, rather than having to concentrate on either the content or the form of the parts, is able to merely duplicate the design in the backing of the puzzle. This does not develop the visual perceptual development necessary for later effective utilization of the geometric forms as letter, and then , total words. It is therefore recommended that early puzzles and geometric concepts to which a child is exposed be carefully selected to assist the child in the achievement of this geometric organization in his visual perceptual development.

Parallel with the development of visual perceptual ability is the necessity to develop motor skills for handling the geometric forms. This is accomplished through the utilization of writing and painting materials. The list is extremely long and includes such items as pencils, crayons, paints, chalk, etc. The development of the written language concept through motor manipulation can be encouraged by labeling the motor-generated forms with their accurate name; i.e., "circle, "square", "triangle," "line,", etc. As the child becomes able to manipulate the designs, the learning process is strengthened through the kinesthetic feedback, and both the motor and the visual perceptual development of geometric forms in space will be learned. The development of the writing and reading perceptual organization ability is enhanced by materials which give the child a designed pattern to duplicate with tiles or other manipulative forms. This develops and strengthens the ability to duplicate forms in a geometric world in a meaningful manner which is basic to the visual perceptual field of reading, and to the motor manipulative field of writing.

Phase two deals with the accurate labeling and development of geometric forms. In the visual perceptual field this is the organization of forms into meaningful numbers and letters. This can be accomplished through materials which expose the child, during the early phases, to the letters and their labels. Exposure possibilities range from flash-cards to books with letters and associated symbols. The development of the reading skill can now be encouraged by exposing the child to the letter and some object in picture form which gives him the basic sound of that letter, e.g., "A for Apple," etc. Concomitantly with this should be the use of writing materials with models for the child to copy and organize into writing abilities.

During this phase, any materials which encourage the ability to appreciate the geometric aspects of the word and the individuality of letters and numbers is important in the strengthening of concepts.

Written language development in writing and reading is considered in phase three. Developmental sequence data recommend that the writing aspects be strengthened first because the motor manipulative ability appears to reward and strengthen the child's awareness of the written word.

The reading development ability occurs second. Materials that encourage the writing of words by copying or originating the form are recommended. These can include flash cards, books, words, or any writing materials. Other materials which motivate the child and function effectively, are simple games which require the identification of numbers, simple letter concepts, short words, etc. The simplest of these are games such as "Bingo" and "Lotto" which have been modified for number as well as alphabet usages.

ORAL LANGUAGE

The development of verbal language is considerably more subtle than simply using words in their correct format.

The first phase of the verbal language development requires access and exposure to many varied simple objects and oral labeling of those objects by older individuals, rather than specific material use. It is important that real and precise naming occurs and not simplified or caricatured naming. The continuation of this phase requires specific materials in the picture book category. Very simple picture books are desirable so that the child can point to and identify particular objects by name.

Phase two finds the child learning to communicate and respond to verbal language. Although this occurs spontaneously in interpersonal relationship with others, a number of materials can be utilized for the strengthening of this behavior. The first are the materials such as toy telephones, which involve communication processes. These can be one-way units, with the child simply speaking to an imaginary individual; or, they can be the self-actuating type with build-in records that ask questions to which the child responds. Of the several talking telephones that were investigated, most allowed an insufficient time pause for the child to respond.

Another group of materials that develop verbal communication skills are those associated with small theatre-type activities, e.g., puppets and dolls. With these, children can verbalize through a secondary source. Obviously, any animal, doll, or other material to which the child gives the anthropomorphism of language and, thus, involves in communication, strengthens this developmental process. The process does not necessarily have to occur in group activities because the child often communicates directly in a two-way conversation with the dolls and toys with which he is playing. The wide diversity of language application with all materials makes specific recommendations difficult. The only group that really should be emphasized is that associated with dolls and puppets. For children who are having language development difficulty, or who are reticent about utilizing language in situations such as "show-and-tell" activity, dolls and puppets are particularly valuable. The inanimate object provides this child with verbal activity opportunities in a non-threatening situation. It must also be emphasized that the exposure of children to television and radio is very influential in language development. This is true not only in terms of broadening the vocabulary content, but in exposing the child to the knowledge that language is structured in many different ways, and has different accents and modes of expression.

The more complex role-playing is also encouraged for language development. Having materials such as cowboy outfits, guns, fireman's helmet, or policeman's helmet available permit the child to change his role. Secondary materials also influence over-all behavior; these may include cash registers for playing store, or objects which can be bought, bartered, etc. The list for role-playing encompasses almost the total line of materials, and is mentioned here only to emphasize the versatility and complexity of role-playing to child development.

The third phase of language development is to correct language usage and structure. Many materials are useful in this category. Initial sentence structure development can be enhanced with the aid of those talking toys which employ correct language usage. They are particularly helpful because the child pays special attention to them. In a little more advanced stage story telling records and books read aloud are valuable. Materials used during this phase should incorporate simple sentences; complex structures and concepts should be minimized. It is during this phase that the first association between oral language and written language is made; and, it is one of the early stages leading to an interest in reading.

TIME CONCEPTS

Materials for the development of the child's time concepts are practically unavailable. This refers to materials that differentiate time into the past and into the future on a quantitative basis rather than simply polychotomizing time into the future; not present and past.
The only materials remotely applicable to this concept are books and records. Unfortunately, the development of this concept is totally dependent upon the skill of the teacher to get the child to understand the quantitative relationships into the past and into the future, and the relative time factors within those time scales.

Many materials are applicable toward the development of a time concept, e.g., family play materials. Developing family role concepts in the child can often be utilized in time concept development through the make believe play of the child, but efficacy depends on the capability and the ingenuity of the teacher in utilizing this particular situation to develop these concepts.

For the immediate naming of time, a number of different clock materials are on the market. These range from actual moving clocks to toy-type clocks but, again, these do not effectively develop the concept of time. Only the numerical application of time in the realm of naming and labeling hours of the day is learned.

QUANTITATIVE CONCEPTS

Quantitative concepts were discussed in the section on arithmetic concepts (Part I - Section III). The additional comment should be made that it is important to understand the difference between the arithmetic concept of "greater,", "less than," and the quantifying relationships within these, and the simple labeling of number concepts.

Many materials on the market are excellent for developing the counting and the labeling of numbers procedures. Blocks, numbered blocks, clocks, banks, registers, flash cards, etc. (depending on the developmental level of the child) are applicable to numerical labeling development. These do not, however, develop the relationship of numbers and the quantitative concept between them. What is needed for this is a material that permits the building of numerical concepts in a visual perceptual manner. This can be partially accomplished by utilizing building blocks and building sticks which are sized on a ratio basis. Showing that two blocks are twice as big as one, or that four are twice as long as two, develops the concept of two times two equaling four, etc.

In the labeling category, many types of materials (felt boards, form boards, etc.) are on the market but it is important to understand that these assist only the development of the labeling concept, and not the quantitative relationship concepts.

SLEEP BEHAVIOR

Although sleep behavior itself is not a specific aspect of the developmental process, most children, during the developmental phases, develop rituals associated with sleep activity. These rituals range from retaining favorite toys to listening to stories or musical instruments. Almost any object which cannot be accidentally swallowed by the child can be utilized for the ritual. This concept is mentioned to emphasize the importance of utilizing the material associated with the ritual to facilitate the sleep behavior of the child. The child will more readily go to sleep when exposed to the material for sleep because of the conditioned association.

COLOR AND DESIGN

Color and design are interlocking developmental concepts. They are extremely important in the development of the child's perception of the world, and in the development of the visual communication procedures leading to good reading. As indicated in the review of this developmental process, the child's behavior switches from the use of pure color to form-oriented drawings, to color and form integrated drawings. This is a relatively slow developmental process and must be achieved by the child in order to develop the skills necessary for later good reading behavior and other visual perceptual functions.

Materials fall into two categories. Color for drawing purposes includes materials such as crayons and paints, applied on various materials ranging from chalk boards to art board and paper. It is important that the child be exposed to paint as well as crayons. Paint offers experience with the fluid aspects of color, as well as the structural aspects of form. The other category of materials for this development includes colored objects such as beads or color form boards, etc. With these items the child learns to organize not only on the basis of form (grouping by blocks vs. spheres vs. cylinders vs. balls) but, also, on the basis of color. Stringing beads and their methods of organizing the colored objects (e.g., sequential bead racks) are extremely valuable in color grouping and geometric grouping.

EMOTIONAL RESPONSES

The development of emotional responses is normally independent of any specific materials. Materials, however, can be associated with emotional responses. Specific fears, for example, are often conditioned to classes of objects and carry over into some of the materials being utilized. On the other hand, materials can be utilized to alleviate some of the conditioned fear responses in the child. The general consideration that should be associated with the exposure of the young child to new materials is whether materials that startle or cause some kind of sudden reaction in the infant could rapidly condition a negative response to these particular materials. This often occurs with toys that make loud noises, or suddenly have objects protruding from them (e.g., Jack-In-The-Box). It is difficult to anticipate what aspect of the particular material will be conditioned to a fear response. It might be the color, the box, or even some other aspect which could then generalize to a whole class of materials, developing in the child a specific fear response.

Passive materials such as stuffed toys can be used to extinguish a fear response. Exposing the child to the neutral animal or doll representing a class of materials reduces the fear response and this modified response can be transferred to the actual object; and, the fear response can be extinguished.

Aggression

The aggressive tendencies of children are normally alleviated by providing materials that permit the channeling of aggressive responses toward objects. The range of materials in this area is extremely varied. Pounding or plastic toys that have been designed for physical aggression are excellent. Stuffed toys and dolls are also successful in reducing aggressive responses. For the older child the availability of make believe play materials such as puppets and dolls for family structures assists the child in acting out some of his aggressive responses to his family members in a play situation. These materials not only assist the development and acting out of aggressive tendencies and emotional responses in the child, but could actually lead toward better mental health.

IMAGINATIVE PLAY

The area of imaginative play is applicable to almost all materials on the market. For the child to utilize his imagination, however, he has to have a number of unstructured materials availabel to him which he can modify for his own use. Some of these basic materials are blocks, sticks, writing and painting materials, dolls and puppets, etc. Furthermore, the teacher should understand that even though materails are semi-structured, the imaginative child will modify their utilization. The teacher should not interfere with, but strengthen this behavior pattern. Teachers often inhibit a child's play by indicating to a child that he is using the particular material incorrectly; this stifles imaginative growth. Unstructured materials should be available in any learning situation, permitting the child to experiment in free imaginative play.

Story telling materials, such as books and records, greatly enhance the growth of imagination. The child is able to develop imagination regarding unknown places and interactive events. Remembering that the young child identifies more readily with animals than with adults, story telling should be animal oriented even though the animals may be given anthropomorphic characteristics.

FAMILIAL AND SELF CONCEPT DEVELOPMENT

The initial development of self concept occurs early during infancy when the child begins differentiating between the self and the external world. No specific materials are of particular value in developing these concepts except for a mirror, within which the child can perceive and visually investigate himself.

The second phase in self concept development is the child's concept of himself in the family role. Dolls and books regarding family members assist the development of these concepts. The child is read stories or is able to participate in play activity regarding family structure.

The third phase of the familial concept of development is strengthened by the availability of clothing and other objects which the child can utilize for role playing. This is the "dress-up" phase. Family structures are improvised during play among children and the children assume the roles of various family members. These activities and materials, expecially books and stories of realistic family structure within the culture of the particular child, are particularly important for the development of self concepts and concepts of family structure for children who are in a home with one or more parents missing. Unfortunately, most of the books available border on fantasy or hypothetical family structure rather than realistic activities within recognizable family structures.

CONCEPT DEVELOPMENT - OBJECT ORIENTED

The concept formation of children develops in sequences along various levels of complexity. The development of these basic concepts is prerequisite to many other developmental factors. We have broken this sequential development into four areas.

Geometric Concepts

These concepts, as discussed in the section on written language (See Part I, Section IV), are basic to the development of the visual perceptual concept leading to reading development.

The first phase for geometric development is that of differentiating basic shapes. The initial manipulative toys are valuable for this. These include triangles, squares, blocks, etc. During the first phase the only major aspect that is pertinent is the ability of the child to differentiate among geometric shapes. Many excellent nesting toys, etc., are on the market.

The second phase of this development requires the child to utilize the visual perceptual concepts of shape, and coordinate them with other shapes. Materials such as form boards and organized stacking toys are available for strengthening this behavior. Puzzles are valuable in developing the concept of the variances in geometric shapes and the importance in coordinating these shapes. Again, it should be noted that wooden puzzles, having no impressions on the tray, should be utilized because they do not cue the child to the different relationships.

Variable shaped building blocks, similar to those produced by Playskool, Creative Playthings, et al, are excellent for teaching the use of geometric shapes in producing "wholes."

The third phase of the development of the geometric concept requires materials which are essentially printed. Materials such as cutouts, etc., which show the relationship between two and three-dimensional geometric designs are valuable to generalize the child's concepts from the two-dimensional to the three-dimensional world and, also, show the constancy of the geometric relationships.

Arithmetic Concepts

The arithmetic concepts are developed in multi-phased sequences:

The first phase deals with the child's understanding of one and more than one. Any materials which can be divided into groups or single units are useful in this category. Blocks, beads, building sticks, and rods, are all helpful. Asking the child to bring "one" or "two" assists in the development of this behavior pattern.

The second phase of development deals with the numerical counting concept; any objects which can be counted are valuable in strengthening this behavior. Beads and blocks are extremely useful.

The third phase of arithmetic concept is the generalizing of the basic numerical concepts. This phase ranges from counting to the understanding of the symbolism associated with written numbers. In this phase also, the concepts of quantity, more or less, or equal to, are developed. This development requires materials which are homogeneous in classification but which can consist of different quantities. A good example of this are different size containers for filling with sand or water to differentiate "more" or "less than". Piles of sand and sand-play materials are excellent for differentiating the "more," "less," or "greater than" concepts. Scales are valuable in conjunction with sand play to teach the child the concept that a large pile is "more" and the smaller pile is "less." Scales also develop the concept of equality. Any materials that are graduated in size, e.g., hollow stacking blocks or pyramids, are valuable in developing the concept of "larger than" and "smaller than". By actually experimenting with different sizes, the child develops the concept that one is larger than the other. This phase of development is concerned primarily with the relativeness of quantitative concept and not the absolute differences concept.

During the fourth phase, the quantitative difference concept develops into an absolute scale. The child begins to understand that "one thing may be twice as much," or "half as much," etc. Numerical symbolic concepts are expanded to larger numbers and simple arithmetic concepts of addition and subtraction (i.e., "add" and "take away" to equal something else) develop.

Any materials which can be manipulated, e.g., blocks, beads, etc., are useful for this concept. For the development of the actual written numbers, flash cards, books, etc., are useful.

Phase five deals with the development of arithmetic concepts and the manipulation of numbers. Both printed materials (e.g., flash cards or books) and manipulative materials (e.g., blocks) are valuable. The basic concepts of formal arithmetic are introduced during this phase, and the child will learn by handling objects as well as by abstract application of numbers.

Concept of Space

The first concept of space that develops is an awareness that things are present in three-dimensional space even though they may not be visually or tactually apparent at the time. Hidden object toys, including "Jack-In-The-Box", stacking blocks that fit inside one another so that one "disappears," or interlocking materials that require the child to search and retrieve, aid in the acquisition of the space concept.

The second phase of the spatial development concept is assisted by building in three-dimensional space. Small and large blocks with which the child can construct two and three-dimensional space projects are extremely valuable because the child can actually see the different dimensions.

The third phase in spatial concept concerns volume; those materials discussed under arithmetic volume concept development are also applicable here.

In the fourth phase of three-dimensional space development the cues for distance and secondary judgment of three-dimensional space may be introduced. The six to eight year old utilized pictures, photographs and printed materials in improving his space judgments.

Concept of Weight and Mass

The concepts of weight and mass are developed slowly. The child's various experiences with different mass materials and relative volume materials contribute to that development. Exposing the child to similarly sized objects (e.g., blocks) composed of different mass materials is a valuable experience in learning to differentiate texture. Our findings indicated that no materials are specifically designed to teach the child the concept of mass or weight, but many materials which are available can readily be adapted for this purpose. Comparing, for example, wooden blocks, plastic and styrofoam blocks of the same size would be one method. The concepts of weight as well as space are associated with arithmetic concepts of comparative weights and comparative distances, so as the child develops absolute arithmetic judgments, he also develops these other concepts with specific application to weight and space.

SUMMARY OF MATERIAL APPLICATION:

The following tables summarize the aspects of child development to which they are applicable. The vertical columns list the categories of materials; the horizontal rows, the aspects of development.

TRANSMITTING INFORMATION

Categories	Age Range	Hand Manipulation	Number Concepts	Geometric Shapes	Real (Environmental)	Reactionary Conception	Oral Language	Written Language	Reading	Globe & Map Skills	Specific Behavior Lrng.	Imagination	Visual Perception	Communication
Farms, Circuses, etc.	3-8	*										*		
Magnifying Glasses	21/2-up					*					*			
Greenhouses	4-up				*	*					*			*
Ant Farm	5-14				*	*					*			*
Live Animals	All				*	*					*			*
Number and Form Toys	21/2-8	*	*	*	*									
Scientific	6-up	*	*		*	*					*		*	
Magnet	4-10	*			*	*							*	
Telephones and Telegraphs	3-up	*				*	*				*			*
Moon & Planetarium	9-17				*					*			*	*
Maps and Globes	5-up				*				*	*			*	*
3D Maps and Science Plaques					*	*			*	*				

TRANSMITTING INFORMATION

Categories	Age Range	Hand Manipulation	Number Concepts	Geometric Shapes	Real (Environmental)	Reactionary Conception	Oral Language	Written Language	Reading	Globe & Map Skills	Specific Behavior Lrng.	Imagination	Visual Perception	Communication
Writing Aids		*						*	*					*
Safety Aids (Sign Learning)	PreSch			*	*				*					*
Color Pictures (Natural Science)					*				*				*	*
Flash Cards														

BUILDING MATERIALS

Categories	Age Ranges	Hand Manipulation	Color Recognition	Number Concepts	Geometric Shapes	Real (Environmental)	Theoretical (Environmental)	Visual Perception	Balance Object	Communications	Touch and/or Taste	Imagination	Eye-hand Coordination
Plastic & Wood Rings, Beads and Blocks	Inf.-5	*	*		*						*		
Boxes (Cloth-nesting-mirror and shape-sorting)	6mo.-4	*			*			*					*
Stacking Rings	11/2-21/2	*			*			*					*
Stacking Toys	3-8	*	*		*	*						*	*
Cubes (simple)	21/2-6	*	*						*				*
Cubes (design)	4-8	*	*		*				*	*		*	*
Blocks:													
2" cube or smaller (plastic)		*	*		*		*		*			*	*
Plus 2" but less than 6" cube Foam	1-3	*	*		*		*		*			*	*
Hollow	2-8	*	*		*		*		*			*	*
6" and larger cube Hollow		*	*		*		*		*			*	*
Hollow-open		*	*		*		*		*			*	*
Wooden Rods		*		*	*		*		*			*	*

OUTDOOR
TOYS

Categories	Age Range	Balance Body	Specific Behavior Lrng.	Hand Manipulation	Swinging Conception	Bouncing	Peddling Movement	Slide Conceptions	Environmental		Digging Concept	Pulling Behavior	Climbing Behavior	Leg Manipulation	Imagination
									Real	Caricature					
Trucks, cars, etc.	2-10+			*					*		*				
Skooters and Dollies	2-8	*									*			*	
Slides (stair)	2-9							*					*		
Ladders	2-10	*		*					*				*		
Swing Sets	2-16	*			*									*	
Swing Sets (with ladders)		*			*								*	*	
Climbing or Swing Rope	4-10+	*	*		*								*	*	
Gyms (climbing)	2-9	*		*									*		
Climbers (all)	2-12	*		*				*					*		
Tunnels	2-9	*	*											*	*
Playhouse or Treehouse	2-10+	*			*			*		*			*		*
See-Saw		*												*	
Merry-go-round		*					*								

OUTDOOR
TOYS

Categories	Age Range	Balance Body	Specific Behavior Lrng.	Hand Manipulation	Swinging Conception	Bouncing	Peddling Movement	Slide Conceptions	Environmental		Digging Concept	Pulling Behavior	Climbing Behavior	Leg Manipulation	Imagination
									Real	Caricature					
Pedal Cars		*		*			*			*					
Wagons		*		*								*		*	
Tricycles & Bicycles		*		*			*								
Slides		*						*							
Horizontal Bars		*	*	*	*										
Trampoline		*	*			*								*	
Ring or Bag Toss Toys				*											
Balls			*												
Digging				*							*				
Sand and/or Water Tables											*				

INDOOR
TOYS

Categories	Age Range	Walking or Leg Movement	Color Recognition	Hand Manipulation	Number Concepts	Geometric Shapes	Oral Language	Written Language	Reading	Touch and/or Taste	Globe and Map Skills	Musical Sounds	Musical Rhythm	Specific Behavior Lrng.	Imagination
Puppets	4-12			*											*
Costumes	4-10														*
Savings Bank				*	*					*					
Musical Instruments:															
Skilled	6-up			*	*				*	*				*	
Non-skill	2-up			*									*		
Record Players				*								*	*		

INDOOR
TOYS

		Environmental													
Categories	Age Range	Real	Caricature	Theoretical	Visual Perception	Balance Body	Balance Object	Communication	Eye-hand Coordination						
Puppets	4-12		•				•	•	•						
Costumes	4-10	•													
Savings Bank									•						
Musical Instruments:															
Skilled	6-up								•						
Non-skill	2-up														
Record Players		•						•							

INDOOR
TOYS

Categories	Age Range	Walking or Leg Movement	Color Recognition	Hand Manipulation	Number Concepts	Geometric Shapes	Oral Language	Written Language	Reading	Touch and/or Taste	Globe and Map Skills	Musical Sounds	Musical Rhythm	Specific Behavior Lrng.	Imagination
Pull Toys	11/2-6	•	•	•								•			
Pull Toys (with inserts)	1-3	•	•	•		•						•			
Push Toys	Inf.-3	•		•								•			
Radio/TV Toys				•			•		•				•		
Registers	2-8		•	•	•								•		
Clocks	1-7		•		•								•		
Crib Toy (stationary)	3mo.-4			•						•					
Crib Toys (mobile)	2mo.-2											•			
Perception Cylinders	8mo.-4		•	•											
Hand-carry Toys (with inserts)	11/2-6		•	•	•										
Sitting or Riding	11/2-6	•													
Homemaker Toys	2-8			•											
Dolls	2-10			•											•

INDOOR
TOYS

Categories	Age Range	Environmental													
		Real	Caricature	Theoretical	Visual Perception	Balance Body	Balance Object	Communication	Eye-hand Coordination						
Pull Toys	11/2-6														
Pull Toys (with inserts)	1-3								*						
Push Toys	Inf.-3						*								
Radio/TV Toys															
Registers	2-8														
Clocks	1-7														
Crib Toy (stationary)	3mo.-4				*										
Crib Toys (mobile)	2mo.-2				*										
Perception Cylinders	8mo.-4				*										
Hand-carry Toys (with inserts)	11/2-6								*						
Sitting or Riding	11/2-6					*									
Homemaker Toys	2-8	*													
Dolls	2-10	*						*							

MANUAL
MANIPULATION

Categories	Age Range	Color Recognition	Hand Manipulation	Geometric Shapes	Reading	Environmental			Musical Sounds	Specific Behavior Lrng.	Imagination	Visual Perceptions	Balance Object	Communication	Eye-hand Coordination
						Real	Caricature	Theoretical							
Puzzles (Black Type)	21/2-7	*	*	*						*		*	*		*
Puzzles (Picture)	2-12	*	*	*	*	*	*								*
Construction Toys	2-12		*	*							*	*			*
Painting Things	3-up	*	*	*		*					*	*		*	*
Color Form Boards	3-up	*	*	*							*	*		*	*
Stamps	4-up	*	*	*			*				*				*
Chalk Boards	3-up		*		*						*			*	
Clay	3-up		*				*				*			*	*
Weaving Toys	7		*			*				*		*			*
Games	6		*		*			*				*			
Scissors & Shears			*			*				*					*
Leather Crafts			*	*							*				*
Wood Craft			*	*							*				*
Sewing			*			*						*			*
Woodworking			*	*		*				*		*			

	Fiction	Fact - Environment	General Education	Group Activity	Individual Activity	Teacher Aid	Supplement to Aid
BOOKS	*	*	*	*	*	*	*
FILMS	*	*	*	*		*	
RECORDS							
Sing Along			*	*	*	*	*
Listen			*	*	*	*	

SECTION II - MANUFACTURERS' MATERIALS SURVEY

The data in this section is based on a survey of manufacturers producing materials in the following general categories:

Wooden toys, primarily for preschool
Drawing and painting materials
Blocks and other building materials
Outdoor play and gymnastic equipment
General sports equipment such as football, baseball, etc.
Educational materials, ranging from models to books,
    slides, maps, globes, and sophisticated electronic
    construction materials
Printed teaching aids
Activity kits, from simple bead stringing kits to
    complex model kits
Jigsaw puzzles
Games requiring two or more people for competition

Generally, most companies were cooperative in supplying information. The findings in this section should not be construed as a criticism of the techniques employed by the various companies. The data is reported to assist individuals in making judgments regarding the expertise backing up the particular materials development. The only companies to be identified by name are those that have a unique capability which should be considered in evaluating their products.

The findings of the companies supplying all requested information is listed in Table 1. This table reflects only the companies supplying data regarding their internal operation and not the companies supplying product information only.

It must be emphasized that it is easy to focus on negative aspects of particular product lines, or techniques of developing materials. The techniques for product development may be considered poor as compared to ideal techniques advocated by educational consideration. However, one must also consider business ramifications and costs. Many desirable techniques which are utilized in an academic or laboratory environment are uneconomical in a business environment. It is, therefore, again emphasized that the report is not meant to critique the business product development procedures but, rather, to identify the procedures used.

CRITERIA FOR SELECTING PRODUCTION ITEMS

The basic criterion for making a production decision is the anticipation of a financially successful product. This is the basic guideline for all business ventures, and permeates this section of the report.

Over fifty percent of the manufacturers indicated that "customer needs" are a major factor in considering an item for production. Analysis of the criteria underlying this factor leads us to modify this conclusion. The customer influence on product development is based on "this is something the customer wants to buy," rather than on whether it meets a basic need in the child development field. There is little evidence (except possibly for Creative Playthings) of a manufacturer having an internal product development group concerned with the true needs of the child development field, and developing a product because it will be helpful to the child development process and producing it with later hopes of financial success. These findings should not be interpreted to imply that manufacturers do not have products on the market that are of great value in meeting the developmental needs of the child. Actually, many commercial products were developed by child development specialists in laboratory or nursery schools and submitted to the manufacturer for production.

Thirty percent of the manufacturers indicated that they follow "educational trends" closely to determine shifts in classroom procedures which will require new products. This is especially true in the academic areas (e.g., new math), and is not as applicable to preschool products.

In the preschool field the trends develop slowly and manufacturers shift their product emphasis to meet the needs they perceive. Unfortunately, their perception of the shift and new requirements often is based on reports from marketing personnel who do not understand the impetus and meaning of an educational trend and, therefore, the products available to meet the needs of the teacher are often poorly designed and not oriented toward actually meeting the need of the child.

A major percentage (seventy-five percent) of manufacturers indicated that before making a final production decision the material is tested in actual school situations. This, then, is utilized for determining the acceptability of the product to the children and, actually to the teacher or administrator who is the ultimate buyer.

Our investigation found one major flaw in this technique, in that each manufacturer has a relatively homogeneous select group of schools or even classroom teachers that are cooperating in product evaluation, and the same concepts are, therefore, repetitively impinging upon a particular manufacturer.

Not one manufacturer supplied evidence of a program of systematic research, development, and field test of their product.

Another major reason for a product production decision (approximately sixty-five percent) is a manufacturer's staff determination that additional products are needed either to compliment their existing line, or requests from customers for additional items. Often the consideration for increasing the product line is simply based on manufacturing capacity and cost factors. Obviously, all of these are again tied to the estimate of potential sales.

Many products are placed on the market and their designs determined and limited by the manufacturer's available tooling This, of course, results in products without design considerations to meet the needs of the developing child.

A minor reason for product development (approximately twenty percent) is based on consultant suggestions. Generally the manufacturer's own marketing, manufacturing, or design staffs have the primary influence on a product being developed and eventually placed on the market.

The results of these findings led the ENKI staff to be concerned by the apparent lack of influence the needs of the developing child has in influencing the manufacturing community. ENKI attempted to determine what corrective procedures could be initiated to remedy this situation. ENKI staff contacted production and management personnel and, concomitantly, reviewed preschool staffs to determine how to coordinate the two in developing new product lines. It was found that the child development specialist is as limited in his understanding of the problems of manufacturing as the manufacturer is of the need of the child development specialist. One obvious finding was that child development personnel are unable to communicate with manufacturers and to develop a compromise in product development. Often the child specialist identifies the need for materials which would be prohibitively expensive to develop, yet the child specialist is unable to assist the manufacturer in developing a compromise design which is feasible for production. Conversely, the manufacturers and product designers are not basically concerned with the value of the product to the child. The manufacturers also have discovered that enthusiastic approval by a few specialists does not assure acceptance by the larger group of ultimate purchasers.

One solution may be the formation of a group of child development specialists within a formal organization (e.g., NAEYC, ACEI, etc.) which would make product recommendations based on consensus of diversified opinion. This would assure wider acceptance and greater markets for new products.

TECHNIQUES FOR RECOMMENDING AGES

Almost all manufacturers whose materials that are not specifically grade oriented make recommendations regarding the chronological ages at which their materials are applicable. Generally it was found that the recommendations are so broad as to be generally meaningless. It appears that the manufacturer estimates the median age and then expands this in both directions to include as large a market as possible. In many instances the age ranged down several years earlier than any child could use the material, and five years longer than it would be of interest or value to the average child. Although a number of manufacturers indicated that they used some evaluative procedure, this generally involved submitting the item to schools or individuals for testing and determining if the children like them and use them. There is no attempt made to identify the age ranges at which the item is of interest to children nor what abilities the child needs to use the materials.

In some instances it was found that materials were an extension of previous product lines to a lower age level, through design simplification. Often the design simplification involved increasing a part size, or reducing the number of parts. From the results of this study, it should be obvious that this is not necessarily a valid technique, as in many facets of the developmental process the sequences change qualitatively, and not quantitatively.

Conversely, in some instances the lack of understanding of child development sequences resulted in manufacturers not recommending materials to the lowest age level at which they are applicable. Generally, materials are recommended for age levels many years beyond that where any child except a mentally retarded would find it of interest or value.

Generally, three techniques for determining age range recommendations were found: the first by the designer or inventor, who recommends a median age and age range; second, the marketing personnel and other manufacturer's personnel who base their recommendations on their experience with toys, which, on close examination reveals a philosophy to recommend an age range which will assure the maximum sales; and, third, informal field testing which consists of observing children with the product.

The ENKI staff concluded that caution should be exercised in purchasing any materials for child development centers based on manufacturers chronological age recommendations. It is suggested that the function of the material and its applicability to the child development sequence be evaluated and then the scales of this report be utilized to determine the developmental level of the children for which the materials will be of value. From this, a range of utilization can be determined.

SAFETY CONSIDERATIONS

All manufacturers claim to follow relatively stringent formal safety procedures, ranging from care in manufacturing to avoid sharp edges, toxic materials, splintering, etc. Safety is also a general design consideration to assure that the design is adequate for the stresses and utilization conditions under which the child will use the particular item.

The field survey by the ENKI staff confirms the general claim by manufacturers regarding safety considerations. The factor that is not brought out by the manufacturers, and which needs to be carefully considered, is that the inappropriate utilization of materials can produce a serious hazard, even though it was not a factor in the design consideration. Examples of these hazards are seen in situations where an infant has access to small objects that can be swallowed (beads, crayons, etc.); where outdoor equipment is utilized that permits the child to climb to a height beyond which an adult can reach, so that if the child panics at the uppermost point of the apparatus the adult has considerable difficulty in assisting the child without injury to one or both of them.

Generally, it can be summarized that safety considerations have to be taken in the utilization of the materials, rather than in the design.

AVAILABILITY OF REPLACEMENT PARTS

The survey indicated that only those manufacturers that have electronically or mechanically complex materials have replacement and maintenance services available. The availability of spare parts is almost non-existent for materials that are not expected to fail or break. Approximately ten percent of the manufacturers indicate consideration to replacing lost pieces from sets.

AVAILABILITY OF SCHOOL-SIZE SETS

This part of the survey was oriented to determine the manufacturers who gave special consideration to the large quantity needs for school-size sets of materials. The findings fell into three categories; first, those manufacturers whose primary market is the institutional organizations package essentially in that quantity, although some others such as globe manufacturers, actually put together sets of globes on carts for classroom use. Generally the school-oriented market had only a packaged system oriented toward the institutional buyer, with the private market having to accept that packaging.

The second group of manufacturers are those whose primary market emphasis is the general public, and ninety percent of these did not have any institutional sized packages available. A few of them indicated that they are planning these, such as Sampsonite, with their "LEGO" system.

The third group (approximately twenty percent) indicated that they package for schools and public use. The manufacturers in this category were primarily those in the creative art field, such as crayons, paints, papers, books, etc.

This part of the survey did not consider discounts to institutions buying large quantities, but only whether the packaging did differ significantly. Packaging is of importance only as related to the ease of handling and storing of large institutionally-geared packages. When one considers the cost involved in several different size packaging, and for some products even a special production of packaging materials, it can be understood why manufacturers whose institutional market is relatively small do not incur special packaging costs. The emphasis must again be made that what the teacher feels should be available for classroom use may not be economically feasible for the manufacturers; nor are institutional buyers willing to pay the added cost that would be incurred by special packaging.

RESEARCH/EVALUATION PROCEDURES FOR DESIGN

The procedures break into several categories which are itemized below.

Field Test

The field test of concepts ranges from sophisticated testing by experts in laboratory situations, to mock-ups.

A number of manufacturers indicate that their evaluation of design simply consists of building of a prototype, and informally submitting it to a number of children from the applicable age range (within their own facilities), observing them and getting their reaction. Many times there are very short term activities, so interest factors and durability factors

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are never evaluated effectively. In a number of cases, pertinent findings are often overruled by the considerations for cost and manufacturing limitations.

The largest percentage of field test (twenty percent of total manufacturers) occurs through informal evaluation by schools and teachers. As indicated in other areas, this evaluation is accomplished by a few selected teachers cooperating with the manufacturers and taking the prototype into the classroom and then reporting on their own findings. There was little evidence that during these procedures any controlled experimentation or standardized anecdotal records were made. Generally, the manufacturer accepts the findings of the teacher as a potential buyer, and causes this to influence the design factors. Because of this, ENKI believes, many design factors which would greatly implement child development are missed. This occurs because of a lack of sophistication of many of the evaluators in child development and the implications of behavioral indices.

Approximately two percent of the total manufacturers surveyed indicated that they have their own staff which critically evaluated the materials. The largest claim in this area is by Creative Playthings, who indicate they systematically evaluate the materials under consideration both with a significant group of children, and by child development experts observing and reviewing the material utilization.

Approximately thirty-five percent of the manufacturers indicated that the design and selection of their materials is based on expert opinion. This falls into two categories: the expert opinion that has designed the material and submits rationale with the material to the manufacturer so they immediately have the total concepts; and, those manufacturers who submit the materials either to their own expert consultants or to organizations that are considered expert in this area, such as ACEI, or NAEYC. This submission is usually to a member of the organization, rather than the organization itself although the manufacturer implies that the organization itself is doing the evaluation. This procedure is probably as effective as the informal field test by unsophisticated observers.

The materials designed by child development experts and then reviewed by a sophisticated consulting staff generally result in designs that meet many of the child development needs for which it is produced. This differs significantly from the field test procedure where the initial design is usually based on the manufacturer's interest in increasing his product line and then has the prototypes evaluated for application. This method generally results in materials not being designed to meet a child development need but, after they are developed, an attempt is made to apply them to some aspect of the child's developmental sequence.

The third category of product design criteria is based simply on modifications of existing materials because of requests for such modifications. Approximately sixty percent of the manufacturers fall into this category and, as indicated by them, obviously their primary interest is in designs that will sell to their market.

The last category, which is approximately thirty percent, indicate that all design considerations are strictly engineering/ manufacturing considerations, and the application of the particular materials to meet the needs of the child are only incidental.

OUTSIDE PROFESSIONAL ASSISTANCE

In this area, almost all companies indicated that they have professional consultants available to them. These range from personnel on their payroll on a per day basis, to organizations or individuals who accept their materials for field testing in laboratories or classrooms. Generally, the individuals qualifications are at a doctorate level in psychology or child development. Unfortunately, during the survey it was impossible to determine how extensively these consultants are used, and what influence, if any, they have on the product design. None of the manufacturers were willing to indicate the scope of this consultant effort. They all implied that it is extensive, and available as required. Although quantifiable data on this factor is not available, in discussing this criterion with the manufacturers, it appears that the manufacturer makes the decisions as to consultant utilization. Generally, they are used when a particular problem is insoluable to the manufacturer, rather than being used routinely in product design.

PACKAGING CONSIDERATIONS

The purpose of this part of the inquiry was to determine if consideration is being given to the packaging durability and storage problems that many schools have. In this category, not one manufacturer indicated durability of the packaging material or reutilization considerations. Generally, the standard commercial reasons for packaging were given, ranging from cost to esthetic value and product salability, etc. Not one company indicated the criterion of reutilization of the packaging materials. The only variation from this finding are those manufacturers who specifically package their materials in reusable containers at considerable extra cost, but in that category, we consider the container as part of the material (package items in plastic boxes that are designed as part of the product) rather than packaging materials.

MATERIALS CONSIDERATION

Approximately ninety percent of the manufacturers indicated that the materials utilized were selected on the basis of manufacturing costs and sales appeal considerations. Informally, approximately ten percent of manufacturers discussed material factors which consider the needs of the child. Formally, these criteria were not part of the product development process, but entered into consideration either informally, or through a consultant. We did not find one manufacturer that primarily considered the weight, warmth, and other psychological factors of child development in material selection.

COLOR SELECTION CRITERIA

Generally, the colors selected were picked by manufacturing and sales considerations. Under some circumstances, such as outdoor equipment, durability became a factor. The closest to a consideration of child development criteria was an indication from several manufacturers that children like bright colors, therefore they were selected. In not one instance was there any indication that colors would be selected to facilitate the teaching of color concepts as a secondary factor with the material. No evidence was given that color, as such, was being considered in the child development concepts. For example, in the utilization of color with blocks or building materials which are normally colored, only the primary, bright colors were picked, rather than gradations of colors which would facilitate the learning of shades and comparisons between shades of the same primary color.

SIZE CONSIDERATIONS

Approximately twenty-five percent of the manufacturers indicated that their size considerations were based on the size of the child, yet when investigated further, it was found that this is based strictly on informal field testing, where children preferred one size to another. No evidence was found of criteria of size or weight being utilized to facilitate the child's manipulative or motor skill development. In every case the design was based strictly on the greatest sales appeal, rather than assisting the child in progressing along the developmental scale. In a number of cases, erroneous criteria resulted from the informal field testing, because they were based on unsophisticated evaluations.

SECTION III - MATERIALS AND TECHNIQUES USED IN CHILD DEVELOPMENT CENTERS

The following tables are the compilation of the materials and procedures utilized by nursery schools, child development centers and laboratory schools. The items reflected the child development sequences found in this study, and the findings are directly applicable to the sequences.

The specific materials indicated by the respondents were fairly extensive and have been grouped, where applicable, into general categories.

These findings do not always coincide with the ENKI findings, but are reported to reflect the activities of pre-school organizations.

1. Eye-hand coordination involving contact and manipulation of large, simple objects.

   Wooden blocks
   Shovels and rakes
   Wheel toys
   Outdoor furniture
   Sand box play
   Play dough
   Nesting toys
   Outdoor baseball w/plastic bat and ball
   Sweeping & dusting
   Plastic blocks
   Balls
   Placing objects in trunks

2. Eye-hand coordination involving contact and manipulation of miniature, complicated objects.

   Puzzles
   Peg boards
   Playschool villages
   Stringing beads
   2-1/2" alphabet letters
   Rubber bands
   Dressing & undressing dolls
   Nail and hammer sets
   Pouring water into container
   Pasting seeds/macaroni on paper
   Buttons & zippers

3. Developmental gross and fine finger and thumb grasping.

   Buttons and zippers
   Puzzles & small blocks
   Scissors, crayons
   Painting at easel
   Blocks w/screws
   Paper punch
   Flannel and chalk boards
   Carpentry
   Sewing
   Egg beaters

4. Development or strengthening of sitting ability.

   Comfortable sitting equipment
   Seated wheel toys
   Small chairs

5. Development or strengthening of crawling ability.

   Small trucks and cars
   Motivation to get objects

6. Development or strengthening of standing ability.

   Use of various surfaces:
   (sand, hills, carpet,
   narrow plank)
   Furniture
   activities requiring standing
   stand for music sessions
   Walker, stroller

7. Development or strengthening of walking ability.

Put ladders on ground: Game of walking between rungs
Walking trips
Walker
Stroller
Pull toys
Regular classroom walking
Scooter
Doll carriage

8. Development or strengthening of running ability.

Use of hills
Incline running board
Random running

9. Development or strengthening of throwing ability.

Balls
"Basket Ball" (ball into container)
Baseball
Bean bags thrown at target

10. Development or strengthening of balancing ability.

Obstacle courses
Climbing on boxes & ledges
Teeter-totter
Incline board
Hopping, jumping
Narrow & wide planks for walking
Walker/skooter
Kiddy-kar
Rhythmic activities to music
Tricycles

11. Development or strengthening of complex bodily skills in physical play activities

Jump rope
Jungle gym
Slide
Tricycles
Carpentry
Skipping and hopping
Climbing boxes & bars
Swings
Shovels for digging
Large innertube for jumping

Visual Perception

12. General identification and use of color

Painting with various shades and intensities of color
Lotto games
Crayons
Beads
Puzzles (color concept)
Formica samples
Abacus
Improvised activities in environment
Paper
Books
Color games
Plastic fruit
Frequent reference to color in conversation

13. Concept development and use of geometric form and design.

Eating and playing with triangle-shaped crackers
Improvised 3D shapes
Puzzles
Wooden snap-blocks in sizes
Sand box shapes
Carpet pieces for tactile sense
Books
Beads
Rubber band boards

14. Ability for distance judgment.

Ball games
Riding motor or engine vehicles
Tricycle riding
Field trips (example: to Hoover Dam)

Auditory Perception

15. Differentiating rhythms.

Piano
Dancing to rhythms
Instruments for individual playing
Record players
Singing

16. Differentiating melodies

Same as item 15.
Also, sing different songs

17. Differentiating pitch.

Vary pitch when reading
Same as Items 15 and 16
Play little and big drums

18. Differentiating harmony.

Same as item 15.
Provide different-sounding music
Children almost too young to comprehend

19. Differentiating volume.

Use of classical music selections rich in dynamics
Use of "outside" voice when out of doors
Playing instruments at appropriate levels for activity and place.

20. Differentiating quality of clearness.

Listening to separate instruments having different sounds; e.g., bells, cymbals, piano, flute

Miscellaneous

21. Organizing sleep activities

    Use of this time as listening time. Provide mats and quiet space to encourage resting.

22. Organizing eating activities.

    Use as reward for cleaned tables. Bring food to them at times when they are playing. Vary eating locations. Group participates together, pours own juice, cleans up by himself. Takes one item of food at a time. Use meals as enjoyable social interaction. Preparation accompanied by songs and fingerplays. Emphasis on learning to pass and to pour; not formal ettiquette or amount of food eaten.

23. Organizing elimination activities.

    Done when necessary only. Go before juice time by themselves No segregation of sexes for this routine.

PERSONAL AND INTERPERSONAL DEVELOPMENT

1. The development and expression of affection and positive feeling.

   Speak in positive terms and with emphasis
   Respond warmly and give affection freely
   Use of full-length mirror and individual photographs with camera.
   Use of literature.

2. The development of techniques for solving conflicts.

   Provide environment that eliminates many conflicts
   Use reasoning to a degree
   General "talking over" of conflicts. Individual solutions
   Duplication of equipment

3. Differentiation of real and unreal fears, i.e., fear of touching fire vs. fear of the dark.

   Exposure to non-threatening "unreal" fears until child's comfidence is increased. Introduction to insects and animals and shared experiences w/natural phenomena

4. Development of acceptable expression of anger and aggressive feelings.

   Redirect aggressive feelings to more constructive activities such as ball-throwing, punching bag, carpentry, pounding. Verbalize.

5. Self concept development through simple bodily recognition.

   Provide mirrors, photographs, movies. Review true stories of children's family life and activities. Use shadows. Compare.

6. Concept of personal responsibility for one's behaviors.

   Have child attend to own responsibilities and behavior. An individual teacher-child relationship when situation arises.

7. Development and use of self-established goals and purposes, as in "ideal self" images.

   Opportunity to choose own activities. Verbalize: 1)goals 2) progress and 3) evaluation. Encourage finishing projects and self-initiated activities.

8. The understanding of the concept of personal possession.

   Reinforce possession of school and individual property. Issue private lockers. Avoid forced "sharing" of own things: only voluntarily.

9. The acquisition of personal values and attitudes toward social relations, such as cooperation, honesty, etc.

   Provide good model in teacher or adult. Never force a child to cooperate: wait until he's ready. Explain and enforce sharing, taking turns, etc.

10. Clarification of views re what "mother," "father," siblings and other family members should be like.

    Use comparisons of families of the children.
    Housekeeping equipment, dress-up clothes
    Literature.

11. Development of concept of child's own position in the family.

    Talk about older and younger family members, babies, informally. Drawing pictures of the child's families, placing himself in a realistic relation to other family members.

12. Clarification of differences in behavior expected between family members, school friends and others.

    Compare acceptable behavior in different locations and situations. Emphasize why these differences do occur. Informal conversation.

13. Stimulate imaginary individual play.

Provide imaginative props (dress-up clothes, dishes, tables), and a creative environment. Respect and encourage imaginative play when it occurs. Listen when child tells imaginative story. Dolls,puppets, rakes, trucks, cars, animals, etc.

14. Stimulate imaginary play with other children.

Provide props involving groups: fire engine, nurse and doctor items, outdoor boxes.

15. Stimulate creative play with materials used by oneself, both inside and/or outside.

Provide various materials with wide variety of uses. Allow free investigation and experimentation without interference. Model some possibilities when needed.

16. Stimulate group play interaction.

Provide large play areas. Assign roles to different children. Use of "play dough" for group interaction. Puppet shows. Block-building projects. Boats, wagons, sleds, digging. Allow freedom in group formation.

17. Development of awareness of environments with which the child is not usually in contact, e.g., farms, airplanes, ships, etc.

Use of pictures, books, imaginative props, experiences of the children, field trips, records, bring animals to school, walking trips--followed with much discussion. Posters, slides.

18. Development of awareness and use of specific environments with which the child is generally in contact, as fire engines, telephone, newspaper, (farm animals, if rural) etc.

Provide books, miniature toys of life-like objects. Provide telephones for practice. Invite visitors to room (firemen, policemen) re-enact various environments and situations. Literature.

LEARNING AND ACHIEVEMENT

1. Understanding the relationship of cause and effect, e.g., explaining natural and mechanical functions.

   Explain cooking processes and questions such as why worms come up in rain; why we need food to live; why blocks fall. Provide natural garden. Experiment with H_2O-ice; grease wheels; slides and gravity. Simple machines.

2. Teaching sequential steps of logical progression.

   Provide occasions in which child sees steps of a progression; putting one more block on a teetering building. Teach progression of: 1) pick up toys, 2) go to bathroom 3) wash hands, 4) drink juice. Provide for field trips which display sequential processes, e.g., farm sends milk to dairy, etc., cooking processes.

3. Use of geometric forms in graphic activities.

   Art work emphasizing particular shapes on certain days. Block-building. Flannel board.

4. Development of the abstract concept of size, as in comparative judgments.

   Provide blocks which are built in size units. Speak of sizes. Compare children's sizes, shoes, etc. (concrete examples). Games; measuring in activities, measure growth of living things.

5. Development of the abstract concept of weight, as in comparative judgments.

   Provide differing weights of wood, etc. (wood compared to cardboard blocks). Compare full and empty containers. Utilize objects in environment. Scales, lifting.

6. Development of the abstract concept of volume, as in comparative judgments.

   Pouring water into various-sized containers. Cooking, making dough, sand box activities.

Speech

7. Development of sound combinations.

   Model clear speech. Use sound games, music and word play.

8. Naming specific objects.

Always give correct name to a new object rather than let children guess its name. Use pictures, environment, field trips. Use repetition.

9. Classing common objects.

Conversations on associations. Use of a table containing one class of objects. Use foods, animals, environment.

10. Sentence structural usage.

Provide a good model. Repeat child's sentence in a gramatically correct form as the means of developing correct usage.

11. Enunciation.

Same as Item 10. Repeat words for children.

12. Inflection used for expressing meaning and feeling.

Teacher's voice should reflect wide variety of feelings and meanings. Dramatize in narration. Avoid pressure and set consciousness that inhibits expressive language.

13. Articulation and ability to converse fluently.

Listen and encourage children to speak before the group.

Written Language

14. The development of letter identification.

At child's request help him write name. Identify child's belongings and work with name. Use 2-1/2" wooden letters. 3D letter play sessions develop letter discrimination more rapidly than 2D letter sessions. Use name cards in some activities. Primer typewriters.

15. The development of printing.

Print child's name on all objects needed to be labeled. Respond to his requests to print (not emphasizing activity as a classroom project). Allow access to paper and crayons.

16. The development of writing.

Not emphasized.

17. The development of ability to distinguish form and sound variation.

Provide stories of great variety--poetry, jingles. Make rhyming games out of words. Match sounds and various shapes and letters. Simple phonics and letter identification.

18. The development of letter recognition in reading.

Not emphasized.

19. The development of use of form and sound combinations in reading.

Read variety of books. Not emphasized.

20. The development of comprehension of word forms.

Emphasize own name.

21. The development of use of sentence structural forms.

Model correct grammar.

Numerical Ability

22. The development of number use, e.g., counting up to ten.

Involve children in number situations and counting, fingerplays. Singing games, birthdays, ages, family members, etc.

23. The development of manipulation of numbers, in adding, subtracting, multiplying and dividing.

No direct lessons; informal use in games using only adding and subtracting. Cutting fruit in half for snacks. Playing "store".

24. The development of making change correctly.

Present concept of receiving change for some purchases.

25. The development of use of time concepts, as in indicating daily activities, e.g., "nap time", etc.

Speak of time in "blocks" such as "before juice", "after juice." Also, speak of being too early, or too late.

26. The development of terms used for specific times, such as day, season, etc.

Simple exposure to these terms only. Morning, night, etc. Use of calendar.

27. The development of the ability to tell time.

Provide clock images in puzzles and environment. Reinforce only those children who can tell time. Match "clock" time to activity time. Large visible clock in each room.

APPENDIX A

SUMMARY OF MANUFACTURERS' REPORTS

BECKLEY-CARDY COMPANY

Sources for Material Qualifications Considered?

Individuals from field of education.
Yes.

Decisions and Expertise That Influence Factual Books/Records.

Experts in specific fields employed to review all material for accuracy and up-to-date representation.

Determination of Format. Outside Assistance. Qualifications and Disciplines.

Artistic appeal and means of communication. Use their own department personnel.

Selection of Subject Matter. Standard Criteria OR Individual Evaluation. Limited Subject Matter; What is Included?

Classroom demand and general survey.
Individual.
Language arts, mathematics, social studies, sci-

Quality Criteria. Factors Influencing Quality of Product.

Durability, effectiveness, cost, certain placing levels.

Determination of Applicable Age Range.

By course of study and reading difficulty level.

CHEVIOT CORPORATION

Sources for Material Qualifications Considered?

Original sources within corporation. They produce, write, etc.

Decisions and Expertise That Influence Factual Books/Records.

Work directly with school systems who furnish consultants.

Determination of Format. Outside Assistance. Qualifications and Disciplines.

Determined by classroom use and teacher needs.
Yes. Professional in specific disciplines.

Selection of Subject Matter. Standard Criteria OR Individual Evaluation. Limited Subject Matter; What is Included?

Selected by need. Standard performance criteria.
Yes. Physical education, dance. Future not limited.

Quality Criteria. Factors Influencing Quality of Product.

Excellence of material, performance, production, printing, artisitic and practical application, visability.

Determination of Applicable Age Range.

Pre-testing all materials in classrooms before production.

GARRARD PUBLISHING COMPANY

Sources for Material Qualifications Considered?

Give selected subjects to experienced authors to write about.

Decisions and Expertise That Influence Factual Books/Records.

Select subjects that follow elementary school program.

Determination of Format. Outside Assistance. Qualifications and Disciplines.

Keep format loose, type faces based on reading level.

Selection of Subject Matter. Standard Criteria OR Individual Evaluation. Limited Subject Matter; What is Included?

Survey of school needs and reading tastes throughout the country. Standard criteria established by experts and consultants.

Quality Criteria. Factors Influencing Quality of Product.

High quality reading books only are published.

Determination of Applicable Age Range.

Through experimentation.

SCHOLASTIC MAGAZINES, INC.

Sources for Material Qualifications Considered?

Often reprints of hardcover editions published by other companies.
Also, original manuscripts.

Decisions and Expertise That Influence Factual Books/Records.

Quality, interest level, reading level.

Determination of Format. Outside Assistance. Qualifications and Disciplines.

Boards of directors and advisors; consultants for proposed books. All are active in the field of children's literature.

Selection of Subject Matter. Standard Criteria OR Individual Evaluation. Limited Subject Matter; What is Included?

Quality, subject matter, interest level, reading level. Evaluated individually.

Quality Criteria. Factors Influencing Quality of Product.

Boards of directors and advisors to review all proposed books.

Determination of Applicable Age Range.

By educators. Use of standard formulae.

TWEEDY TRANSPARENCIES

Sources for Material Qualifications Considered?

Own authors. Qualified educators with classroom experience in presenting subject being produced.

Decisions and Expertise That Influence Factual Books/Records.

Information not supplied by manufacturer.

Determination of Format. Outside Assistance. Qualifications and Disciplines.

Limitations of the medium and the requirements of the subject.

Selection of Subject Matter. Standard Criteria OR Individual Evaluation. Limited Subject Matter; What is Included?

Selected by educators' indication of need. Science, mathematics, music and reading.

Quality Criteria. Factors Influencing Quality of Product.

Very high to protect a well-known and well-thought-of name.

Determination of Applicable Age Range.

Left completely to the teacher involved.

ZANER-BLOSER

Sources for Material Qualifications Considered?

Educational research, workshops, pilot studies.
Yes.

Decisions and Expertise That Influences Factual Books/Records.

Information not supplied by manufacturer.

Determination of Format. Outside Assistance. Qualifications and Disciplines.

Depends on field. Price competition, etc.
Yes. Experience and background.

Selection of Subject Matter. Standard Criteria OR Individual Evaluation. Limited Subject Matter; What is Included?

Individual evaluation of each manuscript. Selection according to need.
Only handwriting included now.

Quality Criteria. Factors Influencing Quality of Product.

Determined through curriculum research, underlying philosophy, teaching techniques, etc.

Determination of Applicable Age Range.

Sales potential and demand.

AMERICAN MACHINES FOUNDRY

Product:	Children's vehicles and bicycles.
Use or Function:	Riding for fun, exercise and physical development.
Skills Required:	Motor, eyesight, judgment of speed and distance.
Rigid or Flexible:	Flexible: play, exercise, therapy guidance.
Ages Designed For, How Determined:	Vehicles: 1-7. Bicycles: 5-adult.
Transportation of Product:	Yes.
Limited Use, or Not:	Varies. One or two passenger.
Used Independently or with Assistance:	Initial try-outs and guidance at ages one and two.
Adequate Size for Age Group? How Determined:	Yes. Determined and adjusted over many years.
Selection Criteria for Materials:	Suitability, durability, high quality, trouble-free operation.
Safety Considerations:	Proper balance, steering, brakes, front and rear reflectors.
Reasons for Color Selection:	Eye appeal, resistance to elements, variety, decoration.
Retail Price Range:	Vehicles: \$5.00-\$25.00. Bicycles: \$30.00-\$60.00.

BRRR PRODUCTS CO.

Product:	Corregated cardboard blocks and building boards.
Use or Function:	Express ideas through imaginative and dramatic play.
Skills Required:	Motor, design, locomotion, counting.
Rigid or Flexible:	Flexible. Used with other toys.
Ages Designed For, How Determined:	Blocks: 2-6. Boards: 4-8.
Transportation of Product:	Yes. Plays important role.
Limited Use, or Not:	No. Often used in groups of 4-5.
Used Independently or with Assistance:	Independently.
Adequate Size for Age Group? How Determined:	Yes. As large as possible, but small enough for mailing.
Selection Criteria for Materials:	Strength, lightweight, safety, storage, packing, shipping.
Safety Considerations:	Lightweight cardboard blocks are safer than wood.
Reasons for Color Selection:	Attractive displays with bright colors.
Retail Price Range:	$4.40 or $8.80.

CADACO INC.

Product:	Games and activity kits.
Use or Function:	Occupy time constructively.
Skills Required:	Color recognition, motor skills, intellectual.
Rigid or Flexible:	Rigid in that game rules are fixed.
Ages Designed For, How Determined:	Varies. Specified by inventor and tested by professionals.
Transportation of Product:	Yes.
Limited Use, or Not:	Depends on product but generally, no.
Used Independently or with Assistance:	Depends on age range of child.
Adequate Size for Age Group? How Determined:	Yes.
Selection Criteria for Materials:	Availability of processing equipment.
Safety Considerations:	Safe from any angle.
Reasons for Color Selection:	Left up to qualified artist to fit into current design trends.
Retail Price Range:	\$1.00-\$9.00.

CHEVIOT CORPORATION

Product:	Phonograph records, A-V materials.
Use or Function:	Classroom teaching aids.
Skills Required:	Motor, locomotion, listening skills, creativeness.
Rigid or Flexible:	Flexible.
Ages Designed For, How Determined:	Kindergarten through Junior College; curriculum and specific needs through classroom testing.
Transportation of Product:	Yes.
Limited Use, or Not:	No. One or whole class.
Used Independently or with Assistance:	Both.
Adequate Size for Age Group? How Determined:	Not applicable.
Selection Criteria for Materials:	High quality, reinforced albums, good vinyl and paper.
Safety Considerations:	Not applicable.
Reasons for Color Selection:	Eye appeal for album covers.
Retail Price Range:	Singles: \$4.00-\$5.98. Libraries: \$29.50-\$33.75.

CHILD LIFE PLAY SPECIALTIES, INC.

Product:	Outdoor play equipment.
Use or Function:	Unusual and high quality play equipment.
Skills Required:	Motor locomotion.
Rigid or Flexible:	Flexible.
Ages Designed For, How Determined:	Fifteen months to early teens.
Transportation of Product:	Yes.
Limited Use, or Not:	Normally three to six but ten or more could.
Used Independently or with Assistance:	Independently.
Adequate Size for Age Group? How Determined:	Yes. Experience.
Selection Criteria for Materials:	Durability, safety, cost, suitability.
Safety Considerations:	High quality materials, resiliant swing seats.
Reasons for Color Selection:	Color in natural wood-color and bright ones.
Retail Price Range:	$1.50-$180.00.

GEORGE F. CRAM CO., INC.

Product:	Maps, globes, charts, models.
Use or Function:	Educational purposes.
Skills Required:	Education.
Rigid or Flexible:	Both rigid and flexible.
Ages Designed For, How Determined:	6-21 years. Products to fit all levels.
Transportation of Product:	Yes.
Limited Use, or Not:	Entire classroom at one time.
Used Independently or with Assistance:	Both.
Adequate Size for Age Group? How Determined:	Yes. Actual testing.
Selection Criteria for Materials:	Ability to take ink.
Safety Considerations:	Non-poisonous inks.
Reasons for Color Selection:	To improve carrying power of map or globe.
Retail Price Range:	$.50-$175.00.

GINN & CO.

Product:	Books.
Use or Function:	Instruction.
Skills Required:	Education.
Rigid or Flexible:	Depends on title or series.
Ages Designed For, How Determined:	K-12.
Transportation of Product:	Yes.
Limited Use, or Not:	Depends on exact title.
Used Independently or with Assistance:	Both.
Adequate Size for Age Group? How Determined:	Information not supplied by manufacturer.
Selection Criteria for Materials:	Standard in book manufacturing industry.
Safety Considerations:	Does not apply.
Reasons for Color Selection:	Aesthetic reasons.
Retail Price Range:	Varies.

W.P.J. HARMAN

Product: Spatter Paint Box.

Use or Function: Art activities.

Skills Required: Finger manipulation. Motor.

Rigid or Flexible: Flexible.

Ages Designed For, How Determined: All ages and stages.

Transportation of Product: Yes.

Limited Use, or Not: One at a time.

Used Independently or with Assistance: Independently.

Adequate Size for Age Group? How Determined: Individual only.

Selection Criteria for Materials: Natural wood, rust-proof aluminum.

Safety Considerations: Rust-proof aluminum moldings.

Reasons for Color Selection: Natural color of wood.

Retail Price Range: $5.00.

IDEAL SCHOOL SUPPLY CO.

Product:	Reading charts, peg-board pictures, reading tapes, reading transparencies.
Use or Function:	Teach and improve basic reading skills.
Skills Required:	Reading readiness.
Rigid or Flexible:	Flexible.
Ages Designed For, How Determined:	Beginning student can start.
Transportation of Product:	Yes (with appropriate products).
Limited Use, or Not:	No. Group participation for all products.
Used Independently or with Assistance:	Supervision at beginning of sequence.
Adequate Size for Age Group? How Determined:	Yes. Experience.
Selection Criteria for Materials:	Durability of materials.
Safety Considerations:	Every consideration taken.
Reasons for Color Selection:	Full color for children's response.
Retail Price Range:	$1.50-$80.00

JINX II CO.

Product:	Jinx II.
Use or Function:	Repetition of numbers to fix additional facts.
Skills Required:	Counting, meaning of addition.
Rigid or Flexible:	Rigid.
Ages Designed For, How Determined:	Age of arithmetic learning (6-9).
Transportation of Product:	Yes.
Limited Use, or Not:	Three to six players.
Used Independently or with Assistance:	Not independently.
Adequate Size for Age Group? How Determined:	Yes.
Selection Criteria for Materials:	Experience with children; colorful box.
Safety Considerations:	None.
Reasons for Color Selection:	Any six bright colors.
Retail Price Range:	$1.00 (Future Price: $1.50).

STAS INSTRUCTIONAL MATERIALS, INC.

Product:	Discovery kits.
Use or Function:	To present self-contained laboratory units (science) for experimentation.
Skills Required:	Motor, locomotion, intellectual, educational skills.
Rigid or Flexible:	Rigid, but with many experiments.
Ages Designed For, How Determined:	Primary through 12th grade. Various levels of difficulty.
Transportation of Product:	Yes.
Limited Use, or Not:	No. Many experiments.
Used Independently or with Assistance:	Used by children; not for teacher demonstration.
Adequate Size for Age Group? How Determined:	Yes. By whether it was large enough for manipulation, small enough for low cost.
Selection Criteria for Materials:	Safety, durability, ease of handling.
Safety Considerations:	Durability and ease of handling.
Reasons for Color Selection:	Not important.
Retail Price Range:	$4.50-$25.00.

R.H. STONE PRODUCTS

Product:	Mor-Pla Jumbo Blox, train, trucks, playmobiles.
Use or Function:	Active, co-operative play.
Skills Required:	Motor, manipulation.
Rigid or Flexible:	Flexible.
Ages Designed For, How Determined:	Pre-school, primary, special education.
Transportation of Product:	Yes.
Limited Use, or Not:	All designed for more than one.
Used Independently or with Assistance:	Both.
Adequate Size for Age Group? How Determined:	Yes. Testing in school groups.
Selection Criteria for Materials:	Suitability, cleanability, durability.
Safety Considerations:	Strength, round edges, non-poisonous, non-inflammable.
Reasons for Color Selection:	Natural uncolored finish for economy and safety.
Retail Price Range:	School field only.

TWEEDY

Product:	Overhead transparencies.
Use or Function:	Large or small group instruction. Complement existing curriculum.
Skills Required:	No specific skills; teacher chooses appropriate materials.
Rigid or Flexible:	Flexible in that each transparency has many overlays.
Ages Designed For, How Determined:	Various age groups determined by the teacher for her particular class.
Transportation of Product:	No. Not designed for this.
Limited Use, or Not:	No; for small or large group use.
Used Independently or with Assistance:	Presented by teacher.
Adequate Size for Age Group? How Determined:	Does not apply.
Selection Criteria for Materials:	High quality acetate used.
Safety Considerations:	Does not apply.
Reasons for Color Selection:	Emphasis and for separation of concepts or color-keying items.
Retail Price Range:	$75.00-$569.00.

ZANER-BLOSER

Product:	Handwriting textbooks and educational materials.
Use or Function:	To develop handwriting skills.
Skills Required:	Develops handwriting skills. Motor needed.
Rigid or Flexible:	Flexible, right or left handed children.
Ages Designed For, How Determined:	Kindergarten through 12. Determined by need.
Transportation of Product:	Yes.
Limited Use, or Not:	One child.
Used Independently or with Assistance:	Requires teacher guidance.
Adequate Size for Age Group? How Determined:	Yes. Determined by space child has to operate in.
Selection Criteria for Materials:	Size, paperweight, opacity, competing products, cost.
Safety Considerations:	Information not supplied by manufacturer.
Reasons for Color Selection:	Color is important role in school materials.
Retail Price Range:	Under $10.00.

BECKLEY-CARDY COMPANY

Product Manufactured:	Workbooks, manipulatives, transparencies, flash cards, teaching aids.
Decisions or Criteria Influencing Selection of Item for Production:	Classroom need, teacher demand, and superiority over existing similar products.
Age Ranges; How Determined:	Recommended. Also surveyed by school systems.
Considerations for Safety:	Non-poisonous coloring, no sharp edges, and stability.
Replacement Parts Available:	Yes, in some areas.
Larger Sets for School:	Only made for schools.
Research/Evaluation Procedures:	Conducted by designers outside of company.
Outside Assistance/Qualifications:	Information not supplied by manufacturer.
Packaging Considerations:	Protection, shipping, storing.
Factors Influencing Selection of Materials, Colors, Size:	Demand through surveys. Appeal to children. Pricing.

BRRR PRODUCTS CO.

Product Manufactured:	Giant cardboard blocks and boards.
Decisions or Criteria Influencing Selection of Item for Production:	Desire to make low cost replacements for similar wooden blocks and boards.
Age Ranges; How Determined:	Blocks: 2-6 years; Boards: 4-8 years.
Considerations for Safety:	Light cardboard. Recommendations by ACE.
Replacement Parts Available:	None needed.
Larger Sets for School:	Creative Playthings of Princeton, N.J. makes large set.
Research/Evaluation Procedures:	Simplicity and testing by ACE.
Outside Assistance/Qualifications:	None.
Packaging Considerations:	Advantage of flat storage over wooden blocks storage.
Factors Influencing Selection of Materials, Colors, Size:	Strength, low cost; bright color for attractiveness; size-suitability for mailing.

CADACO, INC.

Product Manufactured:	Games, puzzles, activity kits.
Decisions or Criteria Influencing Selection of Item for Production:	Opinions of staff balanced against customer need.
Age Ranges; How Determined:	Yes, recommended. By inventors and/or professionals.
Considerations for Safety:	Non-toxic coloring.
Replacement Parts Available:	Available if needed.
Larger Sets for School:	"Standard Pack" designed for schools.
Research/Evaluation Procedures:	Mock-up in recreational center or school, then an evaluation is made.
Outside Assistance/Qualifications:	Products are all submitted by persons from various fields.
Packaging Considerations:	Costs, appeal, display possibility, shelf room.
Factors Influencing Selection of Materials, Colors, Size:	Dictated by equipment; colors for variety; size for practicality and price.

CHILD LIFE PLAY SPECIALTIES, INC.

Product Manufactured:	Outdoor play equipment.
Decisions or Criteria Influencing Selection of Item for Production:	Unfilled need for product within manufacturing and marketing range.
Age Ranges; How Determined:	Yes, by sales personnel recommendation.
Considerations for Safety:	High quality materials, resiliant swing seats.
Replacement Parts Available:	Completely.
Larger Sets for School:	None.
Research/Evaluation Procedures:	Forty years experience.
Outside Assistance/Qualifications:	None.
Packaging Considerations:	Safe shipping, cost, company identification.
Factors Influencing Selection of Materials, Colors, Size:	Durability, safety, cost, suitability.

GEORGE F. CRAM CO., INC.

Product Manufactured:	Maps, globes, charts, atlases, models.
Decisions or Criteria Influencing Selection of Item for Production:	Educational value.
Age Ranges; How Determined:	Yes. Make materials less difficult for lower grades.
Considerations for Safety:	No top-heavy globes and map cases.
Replacement Parts Available:	Completely.
Larger Sets for School:	Yes. Mostly in sets for schools; few to public.
Research/Evaluation Procedures:	Own editorial and research department maintained for investigation and improvement.
Outside Assistance/Qualifications:	Consultants in areas of history, science, geography. Qualified.
Packaging Considerations:	Safe delivery; packing is not for resale.
Factors Influencing Selection of Materials, Colors, Size:	Color to increase readability of product; size through need or want, or size of classroom.

DENOYER-GEPPERT CO.

Product Manufactured:	Educational maps, globes, charts, models.
Decisions or Criteria Influencing Selection of Item for Production:	Estimates of need in total educational program.
Age Ranges; How Determined:	Depends on previous attainments in a given field, not age.
Considerations for Safety:	All products are safe.
Replacement Parts Available:	Completely.
Larger Sets for School:	Both individual and group size.
Research/Evaluation Procedures:	Market acceptance is the main evaluation procedure.
Outside Assistance/Qualifications:	An editorial board is used.
Packaging Considerations:	Customer need.
Factors Influencing Selection of Materials, Colors, Size:	International color theme for maps, visibility and contrast.

ED-U-CARDS MFG. CORP.

Product Manufactured:	Ed-U-Cards and games.
Decisions or Criteria Influencing Selection of Item for Production:	Information not supplied by manufacturer.
Age Ranges; How Determined:	Yes. Determined by actual usage.
Considerations for Safety:	Every consideration.
Replacement Parts Available:	Information not supplied by manufacturer.
Larger Sets for School:	Only one size for schools and homes.
Research/Evaluation Procedures:	Conferences with educators in specific fields.
Outside Assistance/Qualifications:	Constantly. Designers and consultants with extensive qualifications.
Packaging Considerations:	Information not supplied by manufacturer.
Factors Influencing Selection of Materials, Colors, Size:	$.30 to $30.00

FISHER-PRICE TOYS, INC.

Product Manufactured:	Preschool toys.
Decisions or Criteria Influencing Selection of Item for Production:	Salability, the prime consideration.
Age Ranges; How Determined:	Yes. Determined in a testing laboratory with all age groups.
Considerations for Safety:	Concealed mechanisms, shatter proof, non-toxic, round corners.
Replacement Parts Available:	Completely.
Larger Sets for School:	For only two toys: block and cirus set with more pieces in it.
Research/Evaluation Procedures:	Specified materials, laboratory testing, consideration of the child's attention span.
Outside Assistance/Qualifications:	Material and color consultants, child psychologists in universities.
Packaging Considerations:	Salability, protection of product.
Factors Influencing Selection of Materials, Colors, Size:	Material excellence; appealing colors to child; size determined by playability.

GABRIEL INDUSTRIES, INC.

Product Manufactured:	Erector sets, science sets, metal vehicles, airplanes, rifles, pistols, playground equipment, furniture, sports equipment.
Decisions or Criteria Influencing Selection of Item for Production:	Play value, educational value, anticipated demand, compatibility with manufacturing facilities, investment required.
Age Ranges; How Determined:	Not specifically; use of models on packages and catalogues. Parents choose correct toy.
Considerations for Safety:	Material, no sharp edges, sturdiness, shape, design.
Replacement Parts Available:	Completely.
Larger Sets for School:	No, can be used for schools directly.
Research/Evaluation Procedures:	Many specific steps take place before production and each one is evaluated specifically.
Outside Assistance/Qualifications:	Occasionally, when not available internally.
Packaging Considerations:	Attractiveness, protection, cost, utility, FTC regulations.
Factors Influencing Selection of Materials, Colors, Size:	Utility, customer appeal, safety, cost, adaptability to manufacturing facilities.

J.L. HAMMETT CO.

Product Manufactured:	Easels, wooden toys, teaching aids.
Decisions or Criteria Influencing Selection of Item for Production:	Estimate of sales potential, manufacturing cost, difficulty of manufacturing; recommendations of consultants.
Age Ranges; How Determined:	No.
Considerations for Safety:	No sharp edges, non-toxic finishes.
Replacement Parts Available:	Good.
Larger Sets for School:	No.
Research/Evaluation Procedures:	New-product manager decision with aid of consultants.
Outside Assistance/Qualifications:	Consultants: experienced supervisors in public schools.
Packaging Considerations:	Strong cartons.
Factors Influencing Selection of Materials, Colors, Size:	Capability of the shop. Wood and aluminum is used, therefore, natural colors. Size depends on age of child.

W.P.J. HARMAN

Product Manufactured:	Spatter paint box.
Decisions or Criteria Influencing Selection of Item for Production:	Experimentation with methods of painting in pre-school.
Age Ranges; How Determined:	Specifically four to six but can be older.
Considerations for Safety:	Smooth wood, moldings on screen, light weight.
Replacement Parts Available:	None needed.
Larger Sets for School:	Are all individual size.
Research/Evaluation Procedures:	Tested and approved by the ACEJ and schools.
Outside Assistance/Qualifications:	None, except for the teachers worked with.
Packaging Considerations:	Lightweight.
Factors Influencing Selection of Materials, Colors, Size:	Lightweight wood, treated, rust-proof aluminum.

IDEAL SCHOOL SUPPLY CO.

Product Manufactured:	Instructional aids.
Decisions or Criteria Influencing Selection of Item for Production:	Acceptability for average teacher, no need for special instructions, proper description in catalogue, general acceptance.
Age Ranges; How Determined:	Yes. Determind by authors and consultants.
Considerations for Safety:	No sharp edges, no toxic dyes.
Replacement Parts Available:	Completely.
Larger Sets for School:	Made for classroom use first; parents can buy them.
Research/Evaluation Procedures:	Need of classroom teacher determined by authors and consultants.
Outside Assistance/Qualifications:	Consultants with much classroom experience.
Packaging Considerations:	Attractiveness, shipping durability and facile handling.
Factors Influencing Selection of Materials, Colors, Size:	Quality; color to suit product involved.

JINX II CO.

Product Manufactured:	Jinx II.
Decisions or Criteria Influencing Selection of Item for Production:	Need of product as a teaching aid.
Age Ranges; How Determined:	Yes. Experience and curriculum.
Considerations for Safety:	None.
Replacement Parts Available:	Whole set deteriorates at same rate.
Larger Sets for School:	No.
Research/Evaluation Procedures:	Many years of use in the classroom.
Outside Assistance/Qualifications:	Accepted by Ass'n. for Childhood Ed. Intntl.
Packaging Considerations:	Adequacy, cost, attractiveness.
Factors Influencing Selection of Materials, Colors, Size:	Bright colored cards.

R.H. STONE PRODUCTS

Product Manufactured:	Mor-Pla items.
Decisions or Criteria Influencing Selection of Item for Production:	Proof of effectiveness in school use.
Age Ranges; How Determined:	Yes. Preschool, kindergarten, special education.
Considerations for Safety:	Non-poisonous finish, non-inflammable, strength, etc.
Replacement Parts Available:	Available if item has "parts."
Larger Sets for School:	Work only in school field.
Research/Evaluation Procedures:	Testing in schools, teacher evaluation, design requests.
Outside Assistance/Qualifications:	Professional educators test and evaluate. Public school teaching qualifications.
Packaging Considerations:	Good construction, no ornamentation.
Factors Influencing Selection of Materials, Colors, Size:	Suitability, cleanability, durability, pleasing colors, correct size.

TUCO WORK SHOPS, INC.

Product Manufactured:	Picture puzzles.
Decisions or Criteria Influencing Selection of Item for Production:	Tests and experience.
Age Ranges; How Determined:	Yes, by simplicity or complexity of puzzle.
Considerations for Safety:	Avoidance of hazzards.
Replacement Parts Available:	As required.
Larger Sets for School:	No difference.
Research/Evaluation Procedures:	Projected market preference.
Outside Assistance/Qualifications:	Occasionally, artists, box makers, etc.
Packaging Considerations:	Appeal, strength, compactness.
Factors Influencing Selection of Materials, Colors, Size:	Economy, workability, salability.

WEBER-COSTELLO

Product Manufactured:	Instructional materials, art supplies, maps, globes.
Decisions or Criteria Influencing Selection of Item for Production:	Compatability and applicability to latest curriculum trends, teacher response, calssroom tests.
Age Ranges; How Determined:	Occasionally recommended for specific needs of grade levels.
Considerations for Safety:	Durability and non-breakable materials.
Replacement Parts Available:	As required.
Larger Sets for School:	Only for classroom usage.
Research/Evaluation Procedures:	Professional artists used for graphic design for product function.
Outside Assistance/Qualifications:	External design consultants, engineering agencies.
Packaging Considerations:	Attractiveness, protection, ease of opening, re-usability of container.
Factors Influencing Selection of Materials, Colors, Size:	Suitability to subject; attractive colors; legibility requirements for size.

APPENDIX B

LIST OF MANUFACTURERS SUPPLYING PRODUCT DATA

Adirondack Peters, Inc.
Dolgeville, New York.

The Allen Co., Inc.
Charlottesville, Va.

American Playground Device Co.
Hahma, Mich.

Milton Bradley Co.
Orange, Calif.

Binney & Smith, Inc.
New York, N. Y.

George F. Cram Co., Inc.
Rio Vista, Calif.

Child Life Play Specialties, Inc.
Hossiston, Mass.

Children's Music Center, Inc.
Los Angeles, Calif.

Children's Press, Inc.
Chicago, Ill.

Cheviot Corp.
Los Angeles, Calif.

Cuisenaire Co. of America, Inc.
Mt. Vernon, N. Y.

Dance Record Center
Newark, New Jersey

Bell & Howell Co.
Chicago, Ill.

American Machine and Foundry Co.
Olney, Ill.

Beckley-Cardy Co.
Chicago, Ill.

Colee Sales Co., Inc.
Long Beach, Calif.

Cambosco Scientific Co., Inc.
Boston, Mass.

Cadaco, Inc.
Chicago, Ill.

Conn Corporation
Elkhart, Ind.

Ceramichrome, Inc.
Gardena, Calif.

Constructive Playthings
Kansas City, Mo.

Gerrard Publishing Co.
Champaign, Ill.

Educational Activities
Baldwin, N. Y.

Educational Record Sales
New York, N.Y.

Gabriel Industries, Inc.
New York, N.Y.

Hammond
Maplewood, New Jersey

Instructo Products Co.
Philadelphia, Pa.

J.L. Hammett Co.
Union, New Jersey

The Judy Co.
Minneapolis, Minn.

Lyndon Craft
Rosemead, Calif.

Rapaport Bros., Inc.
Chicago, Ill.

Educards
Los Angeles, Calif.

Fisher-Price Toys, Inc.
Erie County, N.Y.

Griggs Equipment, Inc.
Belton, Texas.

Western Publishing Co.
New York, N.Y.

Ideal School Supply Co.
Oak Lawn, Ill.

Ken-A-Vision Mfg. Co., Inc.
Raytown, Mo.

Jinx II Co.
Denver, Col.

Novo Educational Toy
New York, N.Y.

Rainbow Rhythms
Atlanta, Ga.

Playskool Toys
Chicago, Ill.

Samonsite Corporation
Denver, Col.

Rand McNally & Co.
Chicago, Ill.

R.H. Stone Products
Detroit, Mich.

Scott, Foresman & Co.
Palo Alto, Cal.

The Highsmith Co., Inc.
Fort Atkinson, Wisc.

Tweedy
East Orange, New Jersey

Westab, Inc.
Chicago, Ill.

Weber Costello
Chicago, Ill.

X-Acto, Inc.
Long Island City, N.Y.

Scholastic Magazines, Inc.
New York, N. Y.

Sound Book Press Society, Inc.
Scarsdale, N.Y.

Sifo Company
Minneapolis, Minn.

School Days Equipment Co.
Los Angeles, Calif.

The Tuco Work Shops, Inc.
Lockport, N.Y.

The Toy Tinkers
Evanston, Ill.

Weston Woods Studios
Weston, Ct.

Stas Instructional Materials, Inc.
Berkeley, Calif.

The Zaner-Bloser Co.
Columbus, Ohio

APPENDIX C

DIRECTIONS FOR ABSTRACT CARD SORTING

DIRECTIONS FOR ABSTRACT CARD SORTING

For the purpose of material assembly the McBee Key Punch Card was used. These cards are arranged so that there are a possible 122 punches per card. The numbers are 1-33 across the top; L1-L28 down the left side; B1-B33 across the bottom; and R1-R28 up the right side. These read counter clockwise around the card. The punch areas are divided so that 4 digits have to be used for any 0-9 number. Multiple digit numbers require multiples of 4 units. For example, numbers 0-9 use holes 1 through 4; and, 10 to 19 use 1 through 8. To get numbers:

1 punch number 1
2 punch number 2
3 punch number 1 and 2
4 punch number 4
5 punch number 1 and 4
6 punch number 2 and 4
7 punch number 7
8 punch number 1 and 7
9 punch number 2 and 7

10 is obtained by going to the second unit, and punching the 1, leaving the first units blank.

The following are the locations of the data:

		1000	100	10	1
1-16	Category-Primary		9-12	5-8	1-4
17-32	Category-Secondary		28-25	21-24	17-20
33	Books				33
L1-L4	Lower Age (9=birth)				L1-L4
L5-L8	Upper Age (9= age 9 years & over)				L5-L8
L21-L28	Source Year			L25-L28	L21-L24
B1-B16	Author Number	B13-B16	B9-B12	B5-B8	B1-B4

All material gathered was assembled on the key punch cards. They were punched in the various ways to assist in the compilation recovery of the material. The punch coding was broken down in the following manner:

Category-Primary:	Developmental area covered in the article.
Category-Secondary:	Pertinent information found in the article concerning another developmental area.
Books:	Books concerning child development.
Lower Age:	Youngest age given in the article.
Upper Age:	Oldest age given in the article unless above eight years of age; over eight years is considered over age.

Source Year: The year the article or book was published.

Author Number: Each author was given a number.

The above material was typed on the cards with the following reference numbers and/or names.

At: Geographical research location.

(2) Code: Primary category number sometimes followed by a Secondary category number.

: Author number always located in upper right-hand corner of card.

(3): Article or book title.

(4 & 5): Journal name; year published; volume number; and page numbers, or if a book, publisher and year published.

(6): Author and Authors' names - Last name first.

(7): Location of reference to article or book.

(8): Type of developmental study.

(9): Geographical research location referred to in study.

(10): Number of children used in study.

(11): Subjects' ages.

(12): General information of subjects and/or background.

(13): Purpose of study.

(14): Result of study.

(15): Abstract of data including charts (if given).

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